AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A PVR-support video decoding system comprising:

a TS (Transport Stream) decoder for decoding a video PES (Packetized Elementary Stream) from an input TS bitstream to output the decoded video PES;

a video decoder for variable-length-decoding the video PES outputted from the TS decoder, and restoring the video PES to pixel values of an original picture through an IQ (Inverse Quantization) process, an IDCT (Inverse Discrete Cosine Transform) process, and an MC (Motion Compensation) process; and

a PVR (Personal Video Recorder) engine for storing the TS bitstream in a storage medium, extracting video features from the video PES and storing the video feature in the storage medium in the form of meta data, and supporting a search and playback of the TS bitstream stored in the storage medium;

wherein the video features comprise header information identifying a picture coding type and a temporal reference of the TS bitstream ~~the TS decoder, the video decoder, and the PVR engine are constructed in a single MPEG-2 decoder~~.

2. (Original) The system of claim 1, wherein the TS decoder comprises:

a first TS decoder for selecting one of a plurality of channel signals and a PVR input signal outputted from the PVR engine according to a selection signal inputted by a user, TS-decoding the selected signal, and outputting the decoded signal to the video decoder; and

a second TS decoder for selecting one of the plurality of channel signals according to the selection signal inputted by the user, TS-decoding the selected signal, and outputting the decoded signal to the video decoder and the PVR engine.

3. (Original) The system of claim 2, wherein the second TS decoder outputs the TS-decoded video PES to the PVR engine along with the TS bitstream of the selected channel; and

wherein the PVR engine stores the TS bitstream in the storage medium as it is, and extracts the video features from the video PES and stores the video features in the storage medium in the form of meta data.

4. (Original) The system of claim 1, wherein the storage medium is an HDD.

5. (Original) The system of claim 1, wherein the PVR engine comprises:

a video feature extractor for extracting error correction information, header information and macroblock information from the video PES outputted through the TS decoder, analysis characteristics of a video sequence, and then outputting analyzed information;

an index engine for storing the TS bitstream outputted through the TS decoder and the analyzed information extracted by the video feature extractor in the storage medium; and

a search engine for searching for and displaying the TS bitstream and the analyzed information stored in the storage medium.

6. (Original) The system of claim 5, wherein the video feature extractor comprises:

a PES decoder for parsing only a video ES (Elementary Stream) from the video PES outputted through the TS decoder;

a variable-length decoder for variable-length-decoding the video ES;

an error detector for detecting information on a syntax error and a bit-stream error of the present video ES from an output of the variable-length decoder;

a header extractor for extracting header information in the video sequence from the output of the variable-length decoder;

a DC extractor for extracting DC components in macroblocks from the output of the variable-length decoder;

an MV (Motion Vector) extractor for extracting corresponding motion vector information of the respective macroblocks through decoding of motion vectors outputted from the variable-length decoder; and

a video analyzer for detecting whether a thumbnail image is generated and whether a scene is changed by analyzing the detected error information, the header information, the DC components and the MV information, and then outputting the detected information to the index engine and the search engine along with the analyzed information.

7. (Currently Amended) The system of claim 6, wherein the TS decoder detects an error of the TS bitstream and outputs an error indication signal; and

wherein the ~~vide~~ video analyzer confirms a property of the error using an output of the error detector and the error indication signal, and controls to reset values of internal buffers and registers of the video feature extractor or to find next slices or sequences according to the property of the error.

8. (Original) The system of claim 6, wherein the index engine, if the error is detected through the output of the error detector and the error indication signal, controls so that any wrong TS bitstream is not stored in the storage medium, converts time information of a portion where the error is generated into a meta data form, and stores the converted time information in the storage medium.

9. (Original) The system of claim 6, wherein the video analyzer, if a picture coding type extracted by the header extractor is an I- type picture, prepares a memory for storing the DC components extracted by the DC extractor, detects the change of the scene by obtaining a frame

difference and a DC histogram from DC components of the I-picture, and generates a thumbnail image.

10. (Currently Amended) The system of claim 9, wherein the video analyzer estimates brightness of the image from the DC histogram information, and if a dark screen is detected, [[it]] the video analyzer does not generate the thumbnail image.

11. (Currently Amended) The system of claim 10, wherein, in the case that the dark screen is not detected, the video analyzer generates the thumbnail image through a horizontal-line duplication of the DC values stored in the memory if the input ~~bit steam~~ bitstream corresponds to a field picture, while [[it]] the video analyzer generates the thumbnail image using the DC values stored in the memory as they are if the input bitstream corresponds to a frame picture.

12. (Original) The system of claim 6, wherein the video analyzer, if a picture coding type extracted by the header extractor is an I-picture, prepares a memory for storing the DC components extracted by the DC extractor, and stores DC values of any one of four luminance blocks included in the macroblock and DC values of Cb and Cr blocks.

13. (Original) The system of claim 6, wherein the video analyzer, if a picture coding type extracted by the header extractor is an I-picture, prepares a memory for storing the DC components extracted by the DC extractor, and stores an average value of DC values of any one of four luminance blocks included in the macroblock and DC values of Cb and Cr blocks.

14. (Original) The system of claim 6, wherein the video analyzer, if the picture coding type extracted by the header extractor is a P-picture, detects the change of the scene and

estimates an amount of motion of an object in the P-picture by extracting histogram information of a forward motion vector in an integer-pel unit and histogram information of the macroblock type.

15. (Original) The system of claim 6, wherein the video analyzer, if the picture coding type extracted by the header extractor is a B-picture, estimates an amount of motion of an object in the B-picture by extracting only histogram information of the macroblock type.

16. (Original) The system of claim 5, wherein the index engine stores respective analyzed information outputted from the video analyzer in the storage medium in the form of meta data, while it adds a time stamp to the TS bitstream outputted through the TS decoder, scrambles the TS bitstream, and stores the scrambled TS bitstream in the storage medium.

17. (Original) The system of claim 5, wherein the search engine reads out the TS bitstream from the storage medium, removes a time stamp from the TS bitstream, descrambles the TS bitstream, and then outputs the descrambled TS bitstream to the TS decoder.

18. (Original) The system of claim 17, wherein the TS decoder parses the video PES from the TS bitstream outputted from the search engine, and outputs the parsed video PES to the video decoder.

19. (Original) The system of claim 5, wherein the search engine supports a fast forward, a reverse play, a shot detection, a scene segmentation, an intelligent playback, and a thumbnail image display using the meta information stored in the storage medium.

20. (Currently Amended) A PVR-support video decoding system of a digital television receiver having a HDD, comprising:

a first TS (Transport Stream) decoder for selecting one of a plurality of channel signals and a PVR (Personal Video Recorder) input signal outputted from the HDD, decoding a video PES (Packetized Elementary Stream) from a TS (Transport Stream) bitstream of a selected signal, and outputting the decoded video PES;

a second TS decoder for selecting one of the plurality of channel signals, decoding the video PES from the TS bitstream of the selected signal, and outputting the decoded video PES along with the TS bitstream;

a video decoder for variable-length-decoding the video PES outputted from the first and second TS decoders, and restoring the video PES to pixel values of an original picture through an IQ (Inverse Quantization) process, an IDCT (Inverse Discrete Cosine Transform) process, and an MC (Motion Compensation) process;

a video feature extractor for extracting error correction information, header information and macroblock information from the video PES outputted through the second TS decoder, analysis characteristics of a video sequence, and then outputting analyzed information;

an index engine for storing the TS bitstream outputted through the second TS decoder and the analyzed information extracted by the video feature extractor in the HDD;

a search engine for reading out the TS bitstream stored in the HDD to output the readout TS bitstream to the first TS decoder, and simultaneously controlling a playback and a trick play by searching for the analyzed information stored in the HDD; and

an IDE (Integrated Drive Electronics) interface for controlling an input/output of data and control signals among the index and search engines and the HDD[[;]]

~~wherein the first and second TS decoders, the video decoder, the video feature extractor, the index and search engines, and the IDE interface are constructed in a single MPEG-2 decoder chip~~.

21. (Original) The system of claim 20, further comprising a channel selection unit for outputting a channel selection signal to the first and second TS decoders according to a user's request;

wherein, by controlling input paths of the first and second TS decoders using the channel selection signal outputted from the channel selection unit, the system performs a single display which enables a real-time viewing of one channel, a viewing of a time-shifted TS bitstream, a watch & record which enables viewing of one channel program while storing of another channel program in the HDD, and a dual display which enables simultaneous viewing of two channel programs on one screen.

22. (Original) The system of claim 20, wherein the video feature extractor comprises:

a PES decoder for parsing only a video ES (Elementary Stream) from the video PES outputted through the second TS decoder;

a variable-length decoder for variable-length-decoding the video ES;

an error detector for detecting information on a syntax error and a bit-stream error of the present video ES from an output of the variable-length decoder;

a header extractor for extracting header information in the video sequence from the output of the variable-length decoder;

a DC extractor for extracting DC components in macroblocks from the output of the variable-length decoder;

an MV (Motion Vector) extractor for extracting corresponding motion vector information of the respective macroblocks through decoding of motion vectors outputted from the variable-length decoder; and

a video analyzer for detecting whether a thumbnail image is generated and whether a scene is changed by analyzing the detected error information, the header information, the DC components and the MV information, and then outputting the detected information to the index engine and the search engine along with the analyzed information.

23. (Currently Amended) The system of claim 22, wherein the ~~vide~~ video analyzer confirms a property of the error outputted from the error detector, and controls to reset values of internal buffers and registers of the video feature extractor or to find next slices or sequences according to the property of the error.

24. (Original) The system of claim 22, wherein the index engine, if the error is generated, controls so that any wrong TS bitstream is not stored in the HDD, converts time information of a portion where the error is generated into a meta data form, and stores the converted time information in the HDD.

25. (Original) The system of claim 22, wherein the video analyzer, if a picture coding type extracted by the header extractor is an I- type picture, prepares a memory for storing the DC components extracted by the DC extractor, detects the change of the scene by obtaining a frame difference and a DC histogram from DC components of the I-picture, and generates a thumbnail image.

26. (Currently Amneded) The system of claim 25, wherein the video analyzer estimates brightness of the image from the DC histogram information, and if a dark screen is detected, [[it]] the video analyzer does not generate the thumbnail image.

27. (Currently Amended) The system of claim 26, wherein, in the case that the dark screen is not detected, the video analyzer generates the thumbnail image through a horizontal-line duplication of the DC values stored in the memory if the input ~~bit-steam~~ bitstream corresponds to a field picture, while [[it]] the video analyzer generates the thumbnail image using the DC values stored in the memory as they are if the input bitstream corresponds to a frame picture.

28. (Original) The system of claim 22, wherein the video analyzer, if a picture coding type extracted by the header extractor is an I-picture, prepares a memory for storing the DC components extracted by the DC extractor, and stores DC values of any one of four luminance blocks included in the macroblock and DC values of Cb and Cr blocks.

29. (Original) The system of claim 22, wherein the video analyzer, if a picture coding type extracted by the header extractor is an I-picture, prepares a memory for storing the DC components extracted by the DC extractor, and stores an average value of DC values of any one of four luminance blocks included in the macroblock and DC values of Cb and Cr blocks.

30. (Original) The system of claim 22, wherein the video analyzer, if the picture coding type extracted by the header extractor is a P-picture, detects the change of the scene and estimates an amount of motion of an object in the P-picture by extracting histogram information of a forward motion vector in an integer-pel unit and histogram information of the macroblock type.

31. (Original) The system of claim 22, wherein the video analyzer, if the picture coding type extracted by the header extractor is a B-picture, estimates an amount of motion of an object in the B-picture by extracting only histogram information of the macroblock type.

32. (Original) The system of claim 20, wherein the index engine stores respective analyzed information outputted from the video analyzer in the storage medium in the form of meta data, while it adds a time stamp to the TS bitstream outputted through the TS decoder, scrambles the TS bitstream, and stores the scrambled TS bitstream in the storage medium.

33. (Original) The system of claim 20, wherein the search engine reads out the TS bitstream from the storage medium, removes a time stamp from the TS bitstream, descrambles the TS bitstream, and then outputs the descrambled TS bitstream to the TS decoder.